TATUNG

190/195 SERIES COLOUR TELEVISION
(SYSTEMS I & B/G)

SERVICE INFORMATION

Code No. 79 1287 0

SERVICE INFORMATION

1. SAFETY AND ISOLATION

Under no circumstances should any form of repair or maintenance be attempted by any person other than a competent technician or engineer. Most of the circuitry on the chassis is isolated from the mains by T801, C811, C827, R815 and 6mm air gaps. To maintain this safety factor ensure that, after repair, any gaps or leakage paths are not reduced by protruding wires, etc., following component replacement.

NOTE: although the output supply paths from the power supply section are isolated from the incoming mains supply, the bridge rectifier and the control and regulation circuits are not isolated. Therefore, when servicing the power supply section of the chassis, the mains input should be connected via an isolating transformer of at least 200 watts rating.

The power supply section remains charged with respect to chassis for 30-60 seconds after switching off. Care should be taken to avoid touching the power supply area of the chassis during this time.

Components marked ⚠ on the parts list are safety approved types and should be replaced only with components supplied or approved by our Service Department. It is also recommended that components not marked with the safety symbol should be replaced with parts of the type originally fitted. This applies particularly to those resistors which are stood off the printed circuit boards.

HANDLING PRECAUTIONS – Static Electrical Charges

The receiver contains devices which may be damaged by static electrical charges during handling. To avoid damage, soldering irons should be earthed, and personnel should wear wrist straps earthed via a 1Mohm resistor. If the latter is not practical, they should discharge themselves by touching an earthed point.

Sensitive static devices should be packed in suitable conductive containers.

IMPORTANT: although the receiver chassis is isolated, the mains supply should be disconnected during service replacement of such static devices.

2. SWITCHED MODE POWER SUPPLY

2.1 *Circuit Description* – The self-oscillating switching converter circuit centres around IC801 (TDA4605) which provides all the necessary control and protection functions. The operating frequency varies in the range 40-80kHz, depending upon the load conditions.

IC801 controls the MOS power transistor (TR801) which switches T801 primary winding across the rectified mains voltage stored in the reservoir capacitor (C808). AC output voltages of 9.5V, 16V and 115V, developed at taps on the secondary winding, are rectified and smoothed by separate diode/capacitor networks.

The TR801 drive from pin 5 of IC801 maintains constant secondary winding voltages regardless of input or load changes. A control voltage, derived from a TR801 secondary winding, is rectified/smoothed by D808/C806. The attenuated control voltage is applied to IC801 pin 1 and is used to match pin 5 output pulse frequency to secondary load conditions.

R811 and C807 provide pin 2 of IC801 with a voltage proportional to TR801 drain current. This is used in the IC to control the pulse duty factor at pin 5.

R806 (SET HT) adjusts the proportion of the control voltage fed to pin 1 of IC801 and thereby adjusts the output voltage.

The AC control voltage from T801 secondary is attenuated by R805 and fed to pin 8 of IC801 to ensure correctly timed drive pulses for TR801. The zero passage detector at pin 8 senses a zero crossing and thereby enables the control logic.

The supply to pin 6 of IC801 is developed by D807 and C803 from the secondary winding of T801. Start-up voltage is provided via R802 and R803 from a "halfwave" point on the mains rectifier bridge.

2.2. *Voltage Adjustment* – With the receiver locked to a normal picture signal, reduce the brightness, contrast and A1 controls to minimum, i.e. zero beam current. Connect a suitable voltmeter across C407 and adjust R806 for a reading of 115V.

2.3. *Voltage Measurements* – Use a Digital Voltmeter (D.V.M.)

IMPORTANT: All S.M.P.S. voltages on IC801 are measured relative to pin 4 on the IC, ***not*** relative to the chassis. Pin 4 is approximately –330V relative to the chassis.

Integrated Circuit IC801 (TDA4605)

Pin	Voltage	Pin	Voltage
1	0.4	5	1.8
2	1.2	6	10.5
3	1.5	7	3.1
4	0	8	0.44

3. TUNER AND IF AMPLIFIERS

3.1 *Tuner*

The main chassis is fitted with a UHF (System I) or UHF/VHF (System B/G) tuner, TU001. Tuning is achieved by variation of the DC control voltage applied to pin 7. A voltage change is converted into a frequency shift by varicap diodes. A stable 33V tuning control voltage is provided by IC001 (TAA550), the regulator IC, which is connected to the 115V HT supply.

An AFC voltage generated in the IF amplifier (IC101, pin 18) is also coupled, via a resistance network, to TU001, pin 7.

For most aerial input signal levels the tuner operates at full gain. At high signal levels the gain of the tuner is reduced by an AGC voltage generated in IC101. The output at pin 5 is applied to the RF amplifiers via TU001, pin 1.

3.2 *IF Amplifiers*

The IF signal from the tuner connects directly to the S.W. filter (FL101) which determines the major bandpass characteristics of the IF amplifier. The output from FL101 is fed symmetrically to pins 8 and 9 of IC101 (TDA4505).

IC101 amplifies the IF signal before demodulation takes place, with a reference picture carrier signal being supplied by L102. The composite video signal is subsequently amplified within IC 101 and emerges at pin 17.

When tuned to the picture carrier frequency, L102 and its associated capacitors provide a signal which is applied across pins 20 and 21 of IC101. The AFC circuit also uses this reference to produce a control voltage, via a pre-detector/amplifier 90° phase shift network within the IC, at pin 18.

The video component is separated from the intercarrier sound by the 6MHz (System I) or 5.5MHz (System B/G) rejector (FL501). The intercarrier sound component is routed via a ceramic filter (FL601) back into IC101 pin 15. The signal is now limiter amplified, demodulated and fed via a DC volume control (on pin 11) to an audio pre-amplifier. The audio output emerges at pin 12.

The sound IF, tuned by L601 and its associated components, is applied to pin 13 for demodulation purposes.

3.3 *Sound Output* – The controlled audio signal appearing on pin 12 of IC101 is coupled via C603 and R604 to pin 2 of audio power amplifier IC601 (LM380N) which delivers an output up to 1.5 watts into a 16 ohm loudspeaker.

3.4 *Adjustments*

a) Tuner IF AGC – with 10mV RF signal applied, monitor the tuner output with an oscilloscope having a bandwidth equal to or greater than 50MHz. Monitor across only one half of the output and adjust R103 for 0.6V p-p IF signal.

b) Sound Discrimination Coil – with a 1kHz modulated sound carrier as part of the applied RF signal, adjust L601 for maximum sound with minimum noise and distortion.

c) AFC/Detector Coil Alignment – remove any connection to the aerial input socket and ensure the receiver is not tuned to a strong transmission. Enable the AFC by connecting pin 22 of IC101 to +12V via a 1k ohm resistor. Inject a 100mV IF carrier signal (39.5MHz for System I, 38.9MHz for System B/G) into the input of the S.W. filter. Using a multimeter connected across 0V and IC101, pin 18, adjust L102 to give 6V +/-0.5V.

NOTE: there may be more than one tuning point which will give a 6V reading. The correct point will give a rapid swing from almost 0V to 12V for a small adjustment. The incorrect points will give a relatively slow rate of voltage change and will not give the full voltage swing.

4. SYNC. PROCESSOR AND TIMEBASE GENERATORS

4.1. *Circuit Description* – In addition to the IF amplifiers and sound pre-amplifier, IC101 embodies the sync. processor and timebase generators.

Utilising an externally supplied composite video signal and line flyback and field feedback pulses, the IC produces line drive pulses (at pin 26) to switch the line driver transistors TR401/TR402, a field drive ramp voltage (pin 3) to drive the field output IC (IC301), and tuner AGC (pin 5), with tuner AGC takeover control connected to pin 1.

4.2 *Sync. Separator* – The noise protected sync. separator is externally fed from the video stage of the IC via a low-pass filter, and the resultant sync. pulses are sliced for improved noise immunity. Resistor R113, connected to pin 25, determines the slicing level. The sync. separator also feeds pulses to an AGC detector where suitable control voltages are developed.

4.3 *Line Timebase* – Line sync. pulses are supplied to a gated phase detector (an internal gate pulse generator is driven by line flyback pulses fed to pin 27) where they are compared with the sawtooth voltage obtained from the flyback pulse. The resultant output controls the line oscillator whose free-running frequency of 15.625kHz is set by R109, R111 and C111. The long time constant of this control loop is determined by the components connected to pin 24. However, in the absence of sync. pulses (signal), a coincidence detector in the system switches the phase detector to a short time constant condition to enable rapid locking from the out-of-sync. condition. The long time constant is restored immediately the signal locks.

External selection of an AV channel is not necessary. IC101 switches time constants internally so that any channel can be used.

The line oscillator is internally fed to a driver stage which produces a line drive waveform at pin 26.

4.4 *Field Timebase* – Pulses from a sync. separator are fed into a built-in integrator network and the output triggers a vertical oscillator/sawtooth generator whose free-running frequency is set by R105 and C101 at pin 2 of the IC. The resultant sawtooth is compared with a feedback voltage from the field scan coils via R302 and R304 into pin 4. The comparator generates a ramp voltage (appearing at pin 3) which is used to drive the field scan integrated circuit, IC301.

4.5 *Timebase Adjustments*

a) Line Frequency – with an aerial signal of 3 – 10mV, short pin 25 of IC101 to 0V. Monitor the video signal (IC101 pin 17) and line drive signal (TR401 base). Adjust R111 for a stationary line drive signal on the oscilloscope. Remove the short circuit and check for sync. lock.
b) Line Width and Shift – adjust L402 and R117 for correct picture width and centring.
c) Field Height and Shift – adjust R306 and R312 for correct screen height and centring.

5. LINE SCAN AND EHT

5.1 *Line Scan* – Pulses at line frequency from the sync. processor (see Section 4) are fed to the base of TR401 which, with TR402 in Darlington configuration, forms the line driver. The driver transformer secondary provides a low impedance pulse source to switch the line output transistor TR403.

The line scan output circuit is a conventional energy recovery type with the deflection coils tuned during flyback by C404. 'S' correction is provided by C405.

A 26V supply for the field timebase is taken from a secondary winding on the diode-split transformer T402. This is rectified by D403 and smoothed by C409.

A further secondary winding provides power for the picture tube heaters and a reference flyback pulse for the sync. processor IC101.

Output from a tap on the primary winding, rectified by D402 and smoothed by C408, provides a 200V supply for the video output amplifiers.

5.2 *E.H.T.* – The EHT supply to the picture tube (23kV nominal) is produced within T402 by a 3-section diode split overwind. The leakage inductance of T402 and the distributed capacitance of its overwind are tuned to harmonics of line flyback frequency to ensure good EHT regulation.

An integral thick film resistor network is connected across the first section of the overwind to provide adjustable focus and A1 voltages for the picture tube.

5.3 *Beam Current Limiting* – The beam limit circuit draws current from the HT rail (115V) via R409, R513 and D503 to the 12V rail. A tapping point between R409 and R513 draws current in response to beam current level. They are effectively working in opposition to each other.

When the beam current exceeds approximately 0.9mA, D503 stops conducting, thereby limiting the voltage at D502 cathode. D502 then conducts, reducing the contrast voltage at pin 6 of IC501.

6. FIELD SCAN

Field scan is carried out by IC301 (TDA3653B) using a 25V supply derived from the line scan output circuit.

The field drive ramp present on pin 3 of IC101 is fed via R119 to pins 1 and 3 of IC301. The scan current output at pin 5 of IC301 is fed to the field scan coils. The current in the coils is sampled by R307 with the resulting voltage fed back to pin 4 of IC101 as described in paragraph 4.4.

The gain of the field scan amplifier is controlled by R302, R305 and R307. HF stability is maintained by C301, C303 and C308, and linearity by C302 and R303.

For rapid flyback, IC301 is equipped with a flyback generator. The 25V supply to the power amplifier during scan is applied to pin 6 via D301. During flyback the voltage is transferred through C306 to pin 8, causing the voltage to double. This results in a more rapid collapse of the scan coil field until the voltage across the coils falls below 25V when pin 8 swings back to low voltage and the whole cycle is repeated.

7. VIDEO PRE-AMPLIFIER AND COLOUR DECODER

7.1 *Sound Rejector* The composite signal from IC 101 pin 17 is fed through notch filter FL501 (6MHz for System I, 5.5MHz for System B/G) to reject sound information.

7.2 *Luminance Channel* – The video signal is then fed through the chroma rejector/luma delay sections of FL502 and via the luma drive pre-set (R505) to pin 8 of IC 501.

7.3. *Chrominance Channel* – The chroma signal is separated from the composite video by the bandpass filter within FL502, and then fed via DC blocking capacitor C505 to pin 3 of IC501. Within IC501 the chroma signal is amplified and gain controlled by ACC, the user saturation control (pin 5) and the user contrast control (pin 6). These circuits are gated by a burst gate pulse derived from a sandcastle pulse (see paragraph 7.4) connected at pin 7, so that the level of reference burst is independent of user controls.

The processed chroma signal emerging from pin 18 drives the chroma delay line DL501, the U and V outputs being fed back into the IC at pins 13 and 14 respectively.

A crystal controlled oscillator operating at twice sub-carrier frequency is connected between pins 15 and 16, with internal frequency division automatically producing two regenerated sub-carriers 90° apart. An internal H/2 flip-flop, triggered by the sandcastle pulse, provides for PAL switching.

The differential output of an internal burst phase detector controls the 8.8MHz oscillator via pin 15.

Within the IC the colour difference signals are demodulated, the R – Y is PAL switched, the G – Y is matrixed and the Y (luma) component is matrixed. This produces R, G and B outputs which appear on pins 10, 11 and 12 respectively.

7.4. *Sandcastle Pulse* – This pulse is generated within IC101 and is available as an output on pin 27. Connected to pin 7 of IC501, it provides for burst gating, H/2 triggering, black-level clamping and flyback blanking.

7.5 *Colour Killer* This is an internal function of IC501 and can be disabled by applying 11.5V to pin 5.

7.6 *Adjustments*

(i) Reference Oscillator – apply a low level test pattern or colour bars, giving a very noisy locked picture with no colour. Disable the colour killer as described in paragraph 7.5. Adjust R521 to the centre of the range which gives colour lock.

(ii) Delay Line Amplifier – apply a test pattern which contains a sign alternate signal, i.e. alternating B – Y and non-alternating R – Y components. Adjust R522 for minimum Hanover Bars on the peak of the blue output to the tube base.

(iii) Delay Line Output – with a standard colour bar signal, adjust L502 for minimum Hanover Bars.

(iv) Luma Drive – connect an oscilloscope to pin 8 of IC501 and adjust R505 for 0.2V p – p, including sync.

8. PICTURE TUBE BASE PANEL

8.1 *Description* – The panel fitted to the picture tube base includes the supplies to the tube electrodes with their associated components for circuit protection. Internal spark gaps are constructed in the tube socket for connection to the tube external dag coating. Also included on the panel are the video amplifiers, TR201, TR202 and TR203, and their preset adjustments. The focus and A1 supplies are fed from a thick film resistance module embodied in the diode split transformer.

8.2 *Adjustments* (R, G and B Backgrounds) – reduce the A1 control to zero. Adjust the user brightness and contrast controls for normalised settings with colour at minimum.

Adjust R202, R203 and R204 so that the black level measured at each CRT cathode (R904, R905 and R906) is 150V.

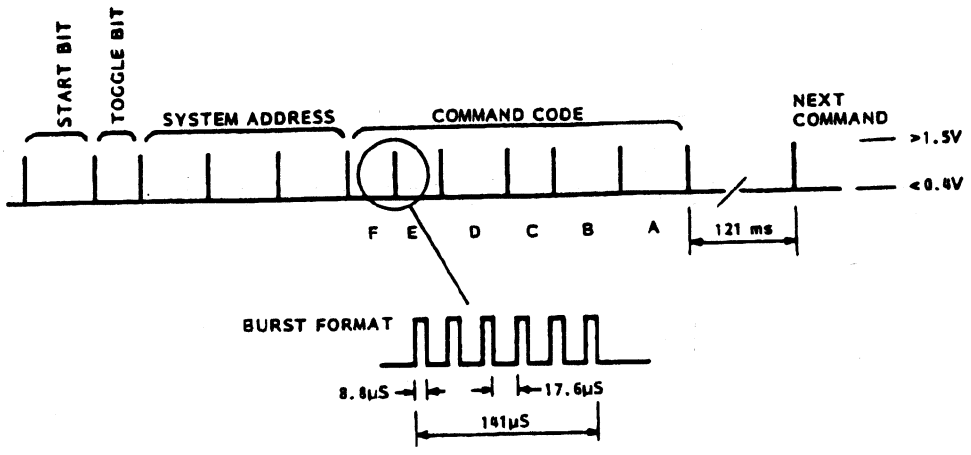
Increase the A1 control for correct overall black level on the display. Grey-scale corrections may now be carried out with only two of the presets.

9. RC95 REMOTE CONTROL (195 Chassis only)

9.1 *Infra-red Transmitter* – The RC95 Remote Control Hand Unit is a self-contained battery operated device. Refer to the circuit diagram overleaf when reading the following description.

The infra-red transmitter consists of a single IC which contains all the circuitry required to scan the membrane keyboard and produce a series of pulses to drive the infra-red transmitting diode.

In the rest state, with no keys depressed, the drive lines (pins 13 – 19, IC790) are held in the 'low' state and the sense lines (pins 2 – 9, IC790) are held in a 'high' state by internal pull-up devices. If a key on the matrix is closed the key position is detected and the corresponding command code is produced at the transmitter output (pin 1, IC790).



Infra-red Transmitter (IC790, pin 1) Output

The command generated by IC790 is a sequence of twelve pulses which define 11 periods. It is the period which denotes a binary '0' or '1' to represent the command as a binary code. The diagram above gives details of the output format. Each of the twelve pulses consists of a burst of 38kHz carrier frequency. The pulse duration is 5.06ms to denote a logic '0', or 7.59ms to denote a logic '1'. The periods between the pulses represent, in order of transmission, the start-bit, a toggle bit, three system address bits and a six-bit command code. The start bit and system address bits always have the same duration regardless of the command used. The toggle bit changes state when a new command is detected. The six bits for each command are shown in Table 9.1.

Function	Command Code Bits					
	F	E	D	C	B	A
Vol +	0	0	0	0	0	1
Vol –	0	0	0	1	0	0
1	0	0	1	0	0	0
2	0	0	1	0	0	1
3	0	0	1	1	1	1
4	0	1	0	0	0	0
5	0	1	0	0	0	1
6	0	0	1	0	1	0
7	0	0	1	1	0	0
8	0	0	1	1	0	1
9	0	0	1	1	1	0
0/10	0	1	0	0	1	0
Mute	0	1	0	1	1	0
Stby	0	1	0	1	1	1

Table 9.1

9.2 *Infra-red Receiver* – The infra-red receive circuit is part of the main chassis. Refer to the main circuit diagram when reading this description.

The coded infra-red signals are detected within the photo module IC703. IC703 incorporates the pre-amplifier and pulse stretcher which directly drive the microprocessor (IC702, pin 20). The pulse-stretched output, pin 4, is normally 'high' (x4.9V) and goes 'low' when an infra-red pulse is received. This drives the event counter on IC 702 which enables the signal to be decoded.

10. MICROPROCESSOR CONTROL SYSTEM

10.1 *Tuning Control* – Tuning is controlled by two keys, 'Freq +' and 'Freq –', on the local keypad. A tuning algorithm is enabled when a tuning key is pressed. This algorithm has two speeds, the faster of which commences after a tuning key has been held pressed for 4 seconds. The algorithm controls a pulse-width modulated (PWM) DAC output (at pin 25 of IC702) which is used to drive TR717. This transistor and its associated components form a low-pass filter to provide a DC representation of the PWM signal. With the supply being derived from the 33V reference line it is possible to cover the whole UHF band with this controllable DC source.

10.2 *Local Controls* – The volume, brightness, contrast and colour are each controlled by two keys, + and –, on the local keypad. IC702 uses four 6-bit DAC's (PWM), pins 16 – 19, to drive the respective output circuits. These present the correct levels to the relevant IC's. Each DAC takes approximately 8 seconds to travel full range.

10.3 *LED Display* – System I receivers have one 7-segment display, and System B/G receivers have two 7-segment displays. These indicate the channel selected i.e. 0 – 9 (System I) or 1 – 19 (System B/G). The decimal point illuminates to acknowledge that a remote control message has been received. IC702 provides a 4-bit Binary Coded Decimal (BCD) signal (pins 3 – 6) for the LED drive IC701 which directly drives D701. Pin 11 of IC702 provides the decimal point signal via TR702.

The power supply is derived from the secondary of the S.M.P.S. transformer which is regulated via IC804 to provide a stable 5V supply.

10.4 *Standby Mode* (195 Chassis only) – The mains On/Off switch (S801) is fitted with a momentary contact which is connected via TR716 to IC702, pin 22. If the mains switch is 'ON' when the mains supply is applied the chassis is placed in 'Standby' mode. This mode is indicated on the LED display by three horizontal bars established by TR701 and associated components.

In this mode the 12V rail is disabled by TR802. This switches off the majority of the chassis, but not the microprocessor control system.

Entry to and exit from the 'Standby' mode can be made using the 'Standby' key on the remote control hand unit. Additionally, any number (digit) key will invoke normal operation from 'Standby' mode.

10.5 *System Test Mode* The test mode can be entered by holding down any key on the local keypad whilst the chassis is powered 'ON'.

Test	Activating Key	Notes
1	vol +	Normalise user controls
2	col +	Tuning defaults (factory use)
3	con +	0%,33%,66%,100% tuning voltage
4	vol –	LED display test
5	col –	0%,50%,100% volume DAC
6	con –	0%,50%,100% brightness DAC
7	bri +	0%,50%,100% contrast DAC
8	bri –	0%,50%,100% colour DAC

Table 10.1 System Test Summary

Note: The chassis will remain in 'Test' mode until it is reset by switching the power 'OFF' and then back 'ON' again.

11. LIST OF COMPONENTS

Components which are marked ⚠ in the Parts List and on the circuit diagram are Safety Approved types and should be replaced only with components supplied or approved by our Service Department. It is also recommended that components not marked with the safety symbol should be replaced with parts of the type originally fitted. This applies particularly to those resistors which are stood off the printed circuit board.

The manufacturer reserves the right to modify the design of the receiver, and to use or supply such alternative components as may be deemed necessary.

The majority of components are fitted to all chassis. Those which are only fitted to some chassis are identified by the following symbols alongside the circuit reference:

\+ Series 190M only
* Series 190Q only
Ø Series 190GM only
$ Series 195 only (all versions)
♦ Early models

11.1 *Resistors*

The majority of resistors are either 0.125W, 0.25W or 0.5W standard carbon film or metal film types which are readily available from component stockists. Replacements should be of the same tolerance and rating as the originals. Refer to the circuit diagrams overleaf for values.

The resistors listed should only be replaced with components approved or supplied by our Service Department.

Cct. Ref.	Value	Tol.%	Wattage	Type	Code No.
R103,117	47K	20	–	Preset pot.	12-3161-2
R111	4K7	20	–	Preset pot.	12-3178-2
R202-R204	2K2	25	–	Mini preset pot.	12-3176-6
R306	100R	20	–	Mini preset pot.	12-3170-7
R312	2K2	25	–	Mini preset pot.	12-3176-6
⚠ R411 +	10R	5	0.5W	MF-flame retard.	11-5292-0/P2
⚠ R411 *	4R7	5	0.7W	MF-flame retard.	11-5291-2
⚠ R413 + *	18R	5	0.5W	MF-fusible	11-5259-9/P2
R413 Ø	22R	5	0.5W	MF-flame retard.	11-5328-5
R433 Ø	10R	5	0.7W	MF-flame retard.	11-5292-0
R505, 522	1K0	20	–	Preset pot.	12-3175-8
R521	10K	20	–	Preset pot.	12-3179-0
R704-708 $	220R	5	0.125W	SFR16 Mullard	11-5214-9
R765 Ø	1K0	5	0.125W	SFR 16 T Mullard	11-5213-0
R801	3R3	10	4W	W/W	11-5105-3
R808	1K0	20	–	Mini preset pot.	12-3175-8
R807	4K3	2	0.4W	MF	11-5354-4
R810, R811	470K	5	0.5W	Metal glaze	11-5318-8
R812	33K	5	4W	Metal oxide	11-5332-3
⚠ R815	10M	5	0.5W	Metal glaze	11-5263-7
⚠ R816	0R22	10	0.5W	Metal film	11-5071-5
R827	47R	5	4W	W/W	11-5357-9
⚠ R901	–	–	–	Thermistor	11-3569-4
⚠ R903	0R33	10	0.5W	MF – fusible	11-5025-1/ P01-02

11.2 *Capacitors*

Capacitor types are identified according to the following codes:
C – ceramic; CD – ceramic disc; CT – ceramic taped; E – electrolytic; MP – metallised polyester; P – polystyrene; PP – polypropylene; TC – tubular ceramic.

Cct. Ref	Value	Tol.%	Voltage	Type	Code No.
C004	220n	10	63V	MP	14-6834-0
C005	47u	20	25V	E	14-6853-7
C006	22u	20	25V	E	14-6850-2
C007	2n2	10	50V	TC	14-6368-6
C009, C010 Ø	47u	20	25V	E	14-6853-7
C011	47u	20	25V	E	14-6853-7
C101	220n	10	63V	MP	14-6834-0
C102	100n	20	50V	C	14-6995-9
C103	220u	20	16V	E	14-6861-8
C104, 105	2n2	10	100V	CP	14-6893-6
C106	10n	20	16V	TC	14-6987-8
C108	1u0	20	50V	E	14-6844-8
C110	22n	10	250V	MP	14-6877-4
C111	2n7	1	63V	P	14-5818-3
C112	10u	20	50V	E	14-6849-9
C113	68n	20	100V	MP	14-6835-9
C114	150p	5	50V	CP	14-6912-6
C115	33n	20	250V	MP	14-6840-5
C116	22n	30	16V	TC	14-6813-8
C117, 118	100n	20	63V	MP	14-6836-7
C119	10n	20	400V	MP	14-6836-3
C201	100n	20	63V	MP	14-6836-7
C202	33n	20	250V	MP	14-6840-5
C203-C205	220p	10	50V	TC	14-6815-4
C301	4n7	10	100V	CP	14-6894-4
C302	6u8	20	50V	E	14-6847-2
C303	470p	10	50V	TC	14-6357-8
C304	1000u	20	35V	E	14-5617-2
C305, 307	100n	20	63V	MP	14-6836-7
C306	100u	20	50V	E	14-6858-8
C308	10n	20	50V	TC	14-6359-4
C401	68n	20	63V	MP	14-6835-9
C402 Ø	12p	2	100V	CP	14-6862-6
C403	10n	20	400V	MP	14-6838-3
C404 + Ø	6n8	5	1500V	PP	14-6868-5
C404 *	6n2	4	2kV	PP	14-6967-6
C405	390n	5	250V	PP	14-6508-6
⚠ C406	1n0	20	250V a.c.	CT	14-6937-1
C407 ♦	47u	20	250V	E	14-6707-7
C407	47u	20	250V d.c	Low ESR	14-6992-4
C408	22u	20	250V	E	14-6822-7
C409	1000u	20	35V	E	14-5617-2
C410 Ø	100n	20	63V	MP	14-6836-7
C410 + *	10n	20	25V	TC	14-6359-4
C411	22n	30	16V	TC	14-6813-8
C412	470u	20	35V	E	14-4701-7
C413 Ø	22n	10	250V	MP	14-6877-4
C501	100n	20	63V	MP	14-6836-7
C502	47u	20	25V	E	14-6853-7
C503	22u	-20/ +80	63V	CP	14-6911-8
C504	4u7	20	50V	E	14-6846-4
C505	100n	20	63V	MP	14-6836-7
C506, 507	1u0	20	50V	E	14-6844-8
C508, 509	10u	20	50V	TC	14-6849-9
C510 Ø	10u	20	50V	TC	14-6359-4
C511	10n	20	50V	TC	14-6359-4
C512	1u0	20	50V	E	14-6844-8
C513	100n	20	63V	MP	14-6836-7
C514	12p	5	50V	TC	14-6727-1
C515-C517	12p	5	50V	TC	14-6988-6
C518	10n	20	50V	TC	14-6359-4
C519	47n	20	63V	MP	14-6879-0
C520	10n	-20/ +80	63V	CP	14-6892-8
C528 Ø	100n	20	50V	CD	14-6995-9

11.2 *Capacitors* (cont'd)

Cct. Ref	Value	Tol.%	Voltage	Type	Code No.
C601	10n	-20/ +80	63V	CP	14-6892-8
C602	56p	5	50V	TC	14-6609-7
C603	100n	20	63V	MP	14-6836-7
C604, 605	10n	-20/ +80	100V	CP	14-6892-8
C606	470u	20	25V	E	14-2800-4
C607	4u7	20	50V	E	14-6846-4
C608	220n	10	63V	MP	14-6834-0
C609	4n7	10	100V	CP	14-6894-4
C610	220u	20	16V	E	14-6861-8
C611	100u	20	10V	E	14-6854-5
C701	10n	20	16V	TC	14-6987-6
C702, 703	10u	20	50V	E	14-6849-9
C705	2u2	20	50V	E	14-6845-6
C706	3u3	20	50V	E	14-6895-2
C707	470n	10	63V	MP	14-6869-3
C708-C710	1u0	20	50V	E	14-6844-8
C711 $	4u7	20	50V	E	14-6846-4
C712 $	100u	20	25V	E	14-6856-1
C713, 714 $	220n	10	63V	MP	14-6834-0
C715 $	22u	20	25V	E	14-6850-2
C790 $	100p	2	50V	CP	14-6884-7/ P05-13
C791 $	120p	2	50V	CP	14-6946-0/ P05-13
C792 $	470u	20	6.3V	E	14-6966-5/ P15-19
C801	220n	20	250V a.c.	-	14-5163-4
C802 Ø	220n	20	250V a.c.	-	14-5163-4
C803	220u	20	16V	E	14-6861-8
C804	220n	10	63V	MP	14-6834-0
C805	4n7	10	50V	TC	14-6606-2
C806	1u0	20	50V	E	14-6844-8
C807	4n7	10	100V	CP	14-6894-4
C808	100u	-10/ +30	385V	E	14-6870-7
C809	1n5	10	1.5kV	MP	14-6649-6
C810	33n	10	1000V	PP	14-6991-6
⚠ C811 Ø	1n0	20	400V a.c.	CD	14-6949-5
C812	100u	20	25V	E	14-6856-1
C813	2200u	20	35V	E	14-4733-5
C814 ♦(+ *)	47u	20	250V	E	14-6707-7
C814 + *	47u	20	250V d.c.	Low ESR	14-6992-4
C815	100n	20	63V	MP	14-6836-7
C816	10u	20	50V	E	14-6849-9
C817	100u	20	25V	E	14-6856-1
C819	220n	10	63V	MP	14-6834-0
C820	2n2	10	100V	CP	14-6893-6
C821-C824	1n0	20	250V a.c.	CT	14-6937-1
C825	100n	20	400V	MP	14-5003-4
C826	100n	20	63V	MP	14-6836-7
⚠ C827	3n3	20	400V a.c.	-	14-6977-0
C901	10n	-20/ +80	2.5kV	C	14-3906-5

11.3 *Integrated Circuits*

Cct. Ref.	Description	Code No.
IC001	ZTK 33P	19-3443-0
IC101	TDA 4505 Mullard	19-8334-2
IC301	TDA3653B	19-8387-3
IC501	TDA 3565 N6	19-8357-1
IC601	LM 380N	19-7603-6
IC701	C MOS 4511 BP	19-8326-1
IC702 + Ø	HD 401220 Hitachi	19-8315-6
IC703 $	TFMP 2380 Telefunken	19-8337-7
IC790 $	SAA 3008 Mullard	19-8272-9
IC801	TDA 4605 Siemens	19-8329-6
IC803	LM317T	19-8264-8
IC804	L78M05CV S.G.S.	19-8333-4

11.4 *Transistors*

Cct. Ref.	Description	Code No.
TR101	BC547	19-8145-5
TR201-TR203	BF422	19-8150-1
TR301	BC337	19-8149-8
TR401	BC547	19-8145-5
TR402	BC337	19-8149-8
TR403	S2000AF Toshiba	19-8261-3
TR501	BC547	19-8145-5
TR701 $	BC557	19-8146-3
TR702, 710	BC557	19-8146-3
TR703-TR706 Ø	General purpose PNP	19-8146-3
TR707-TR709 Ø	General purpose NPN	19-8145-5
TR711-TR714	BC547C	19-8164-1
TR715	BC547	19-8145-5
TR716 $	BC547	19-8145-5
TR717	2N4401 Toshiba	19-8335-0
TR790 $	BC368	19-8283-4
TR801	BUK454-800 Philips	19-8359-8

11.5 *Diodes*

Cct. Ref.	Description	Code No.
D301	1N4003	19-6405-4
D401	BY133	19-8144-7
D402	BA159L	19-8338-5
D403	BA157	19-4028-7
D501-D503	1N4148	19-3992-0
D701	LED Display TLR332T Toshiba	19-8336-9
D702	LED Display TLR332T Toshiba	19-8336-9
D703, 705 $	1N4148	19-3992-0
D704 Ø	LED TLRG101 Toshiba	19-8355-5
D706-D709 Ø	1N4148	19-3992-0
D710	Schottky Switch BAT85	19-8163-3
D790 $	Infra-red Emitting TLN115 Toshiba	19-8282-6
D801-D804	BY133	19-8144-7
D805	RGP15M General Instrument	19-8340-7
D807	BA157	19-4028-7
D808	1N4148	19-3992-0
D809	BA159L	19-8338-5
D810	BA157	19-4028-7
D811	BY396	18-2222-5/ P02-08
D812	1N4003	19-6405-4
D813-D814	1N4148	19-3992-0
D815 $	1N4148	19-3992-0

11.6 *Coils, Chokes*

Cct. Ref.	Description	Code No.
L001	Choke 15uH	15-7529-8
L002,003 Ø	Choke 10uH	15-7652-6
L004	Choke 10uH	15-7652-6
L101	Choke 10uH	15-7528-7
L102	AFC Coil	85-9811-8
L103, 104	Choke 10uH	15-7528-7
L105	Choke 6u8H LAL 04T 6R8K	15-7610-0/ P14-07
L401 Ø	Choke 10uH	15-7528-7
L402	Coil-linearity/width	85-9792-8
L403 + *	Choke 22uH	85-1118-0
L404 Ø	Choke 4uH	85-1798-3
L405 Ø	Choke 10uH (high current)	85-1753-3
L406, 407 Ø	Choke 10uH	15-7528-7
L501	Choke 10uH	15-7528-7
L502	Coil-delay line output	85-9654-9
L503 +	Choke 12uH	15-7660-7
L503 Ø	Choke 10uH	15-7528-7
L504 - L506 Ø	Choke 3.3uH	15-7603-8
L507	Choke 15uH	15-7529-5
L601	Coil-sound detector	85-9650-6
L602 Ø	Choke 10uH	15-7528-7
L701	Choke 10uH	15-7528-7
L801 Ø	Choke 4uH	85-1798-3

11.7 *Ferrite Beads*

Cct. Ref.	Description	Code No.
FB401, 402 Ø	FX4016 Mullard	15-7590-2
FB801	FX4021 Mullard	15-7578-3
FB802, 804, 806 Ø	FX4021 Mullard	15-7578-3
FB805 Ø	FX4016 Mullard	15-7590-2

11,8 *Transformers*

Cct. Ref.	Description	Code No.
T401	Line Drive	85-9986-6
⚠ T402 + *	Diode Split	85-9845-2
⚠ T402 Ø	Diode Split	87-0016-8
⚠ T801	Switched Mode Power Supply	87-0019-2

11.9 *Filters, Crystals, Delay Lines*

Cct. Ref.	Description	Code No.
FL101 + *	S.W. Filter – SW153A	15-7635-6
FL101 Ø	S.W. Filter – SW174A	15-7629-1
FL501 + *	Ceramic Filter – 6MHz	15-7657-7
FL501 Ø	Ceramic Filter – 5.5MHz	15-7657-7
FL502	Coil, chroma	15-7651-8
FL601 + *	Filter – ceramic, 6MHz	15-6981-3
FL801 Ø	Filter – ceramic, 5.5 MHz	15-7039-0
FL801 Ø	Mains Filter	15-7637-2
XL501	Crystal – 8.8MHz	16-1901-2
XL701	Ceramic Resonator – 4MHz	15-7632-1
XL790 $	Ceramic Resonator – 455kHz	15-7630-5
DL501	Delay Line DL700B – Philips	15-7659-3

11.10 *Connectors*

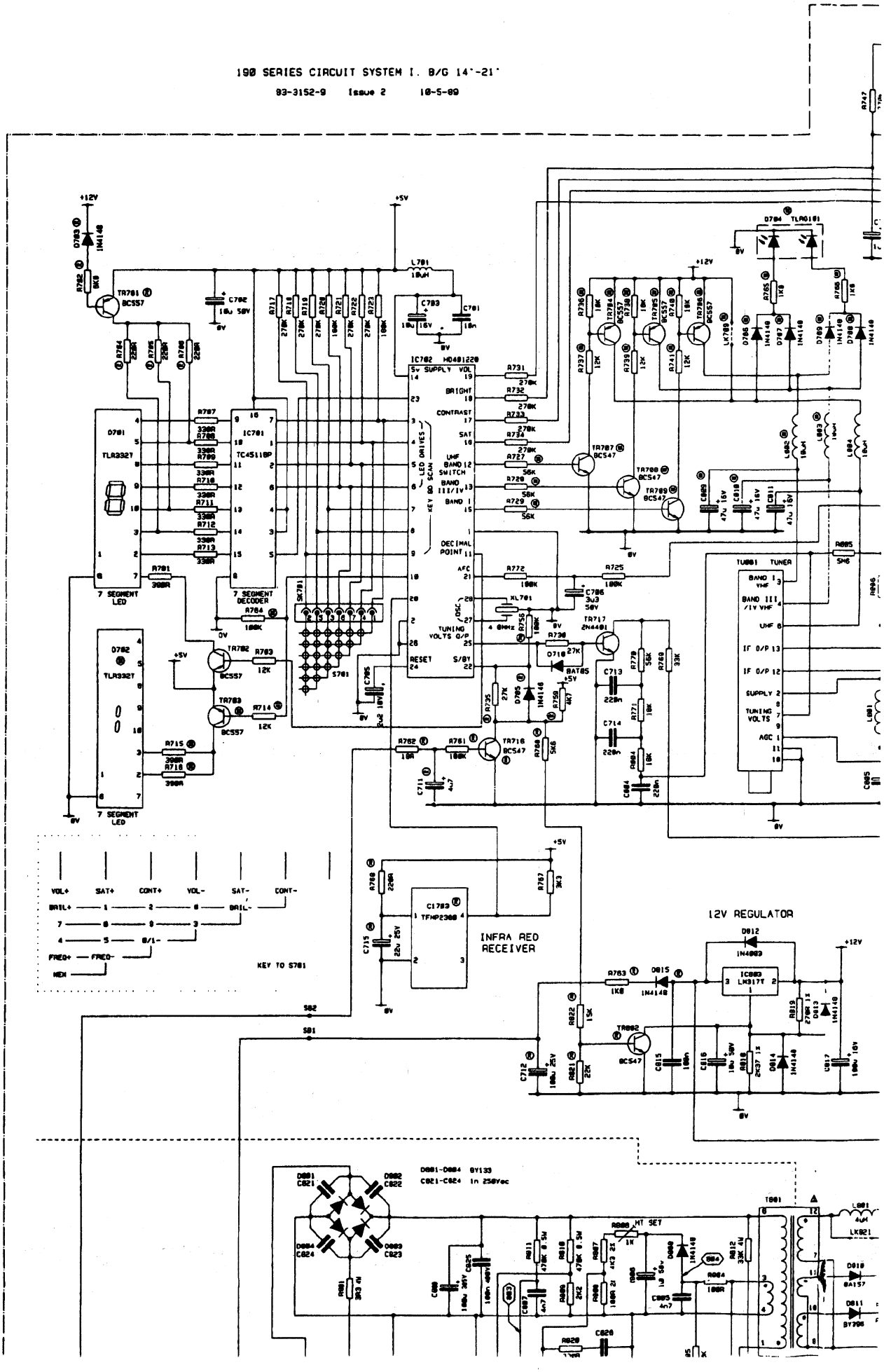
Cct. Ref.	Description	Code No.
PL401 + *	5 – way plug	42-0212-0
PL404 Ø	5 – way plug	42-0212-0
PL801	2 – way plug	22-8001-9
PL801	3 – way plug	22-8168-6
PL901	2 – way plug	42-0211-2
SK201	9 – way socket	22-8209-7
SK701 + Ø	7 – way socket	22-8208-9
SK701 *	7 – way socket	22-8221-6
SK790 $	10 – way socket	22-8211-9

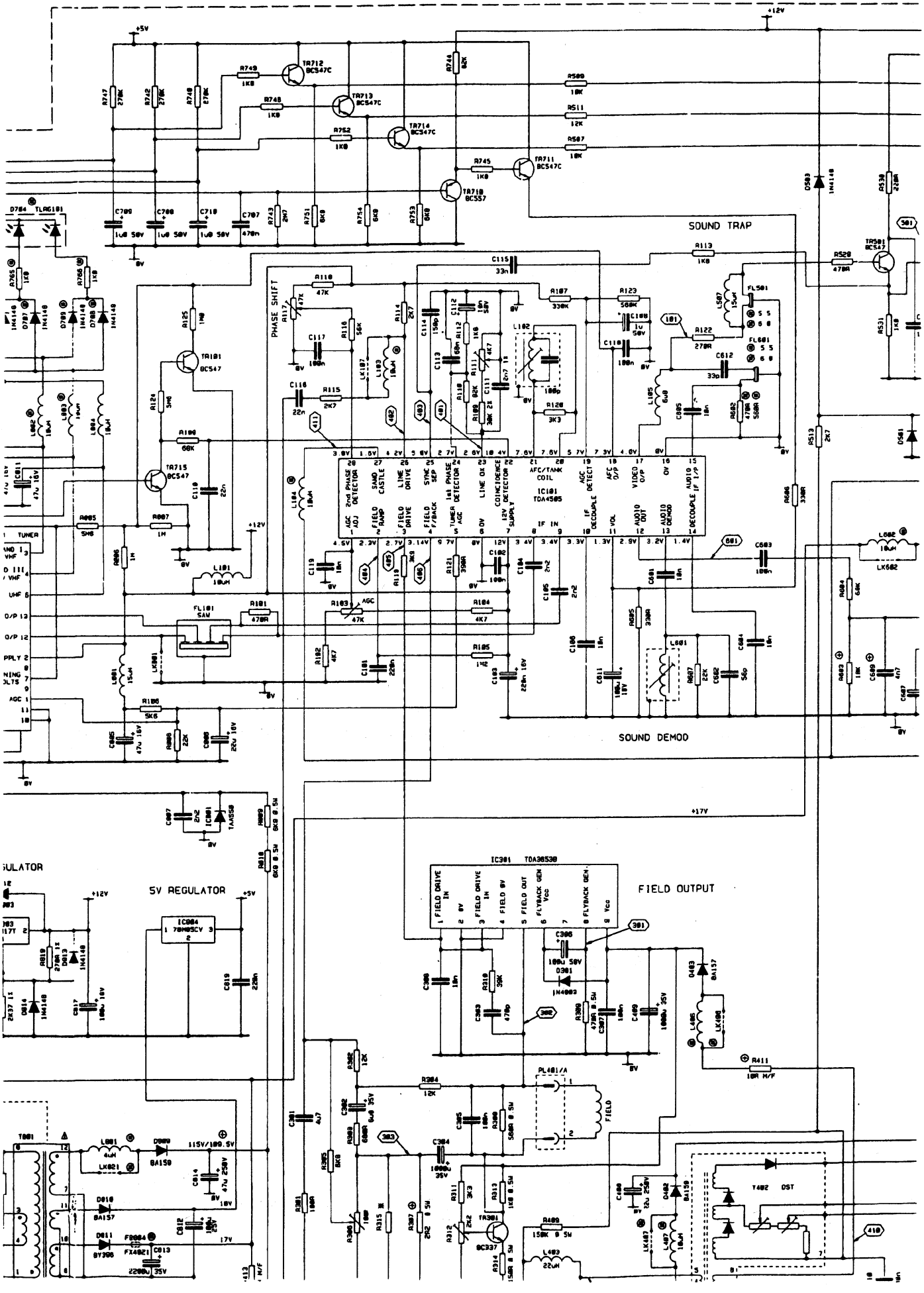
11.11 *Miscellaneous*

Cct. Ref.	Description	Code No.
TU001 + *	Tuner 3010 UEC 342 940 Telefunken	21-3681-3
TU001 Ø	Tuner 2000 KHC 272 195 Telefunken	21-3690-2
⚠ S801 + * Ø	Mains ON/OFF switch	20-4060-3
⚠ S801 $	Mains ON/OFF switch	20-4073-5
⚠ FS801	Fuse 1.25A – time lag	21-3655-1
FS801A	Fuseholder	21-2626-1
–	Carrier Membrane	83-2773-4/ 20000
–	Membrane Switch	83-2807-2/ 40110
–	Socket – c.r.t. base	22-8095-7
– $	RC90 Remote Control Hand Unit	
	– complete	05-4047-1
	– top cover	83-2808-0/ 29800
	– base cover	83-2809-9/ 29800
	– battery cover	83-2810-0/ 29800
	– membrane	83-2813-7/ 40110
	– p.c.b.	83-2973-7
	– battery contact (single)	83-2811-0
	– battery contact (double)	83-2812-9

190 SERIES CIRCUIT SYSTEM I. B/G 14"-21"

93-3152-9 Issue 2 10-5-89

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TA714 BC547C
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TA710 BC557
TR101 BC547
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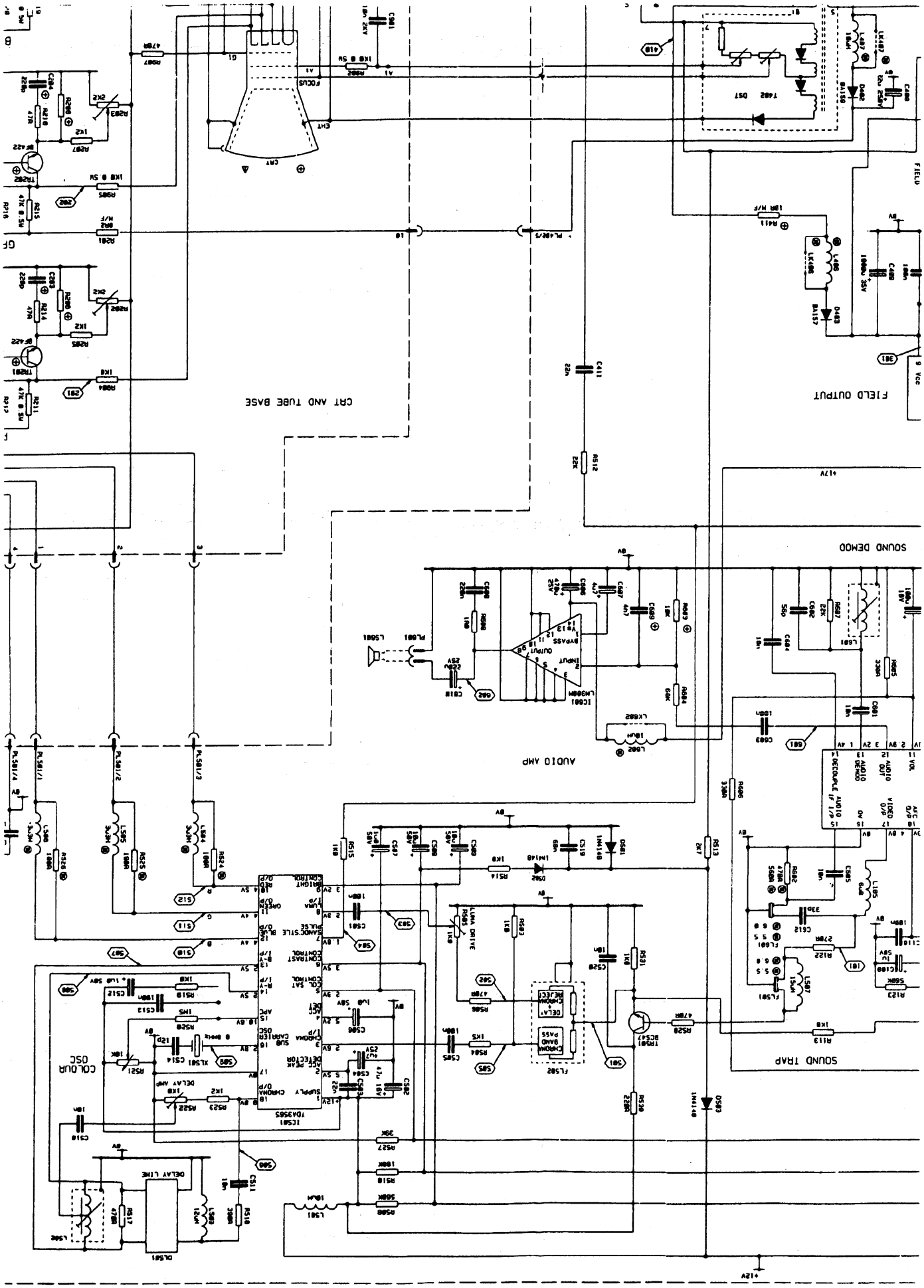
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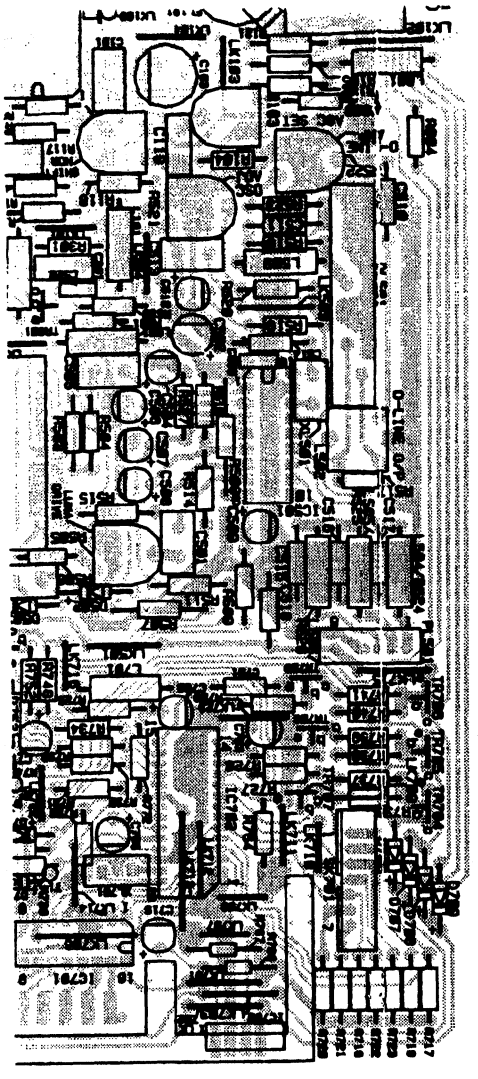

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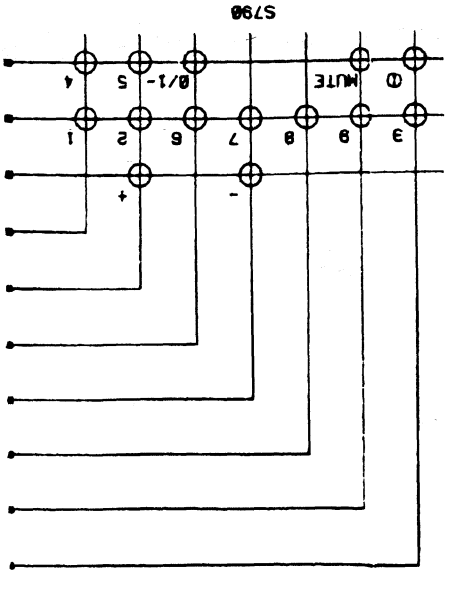
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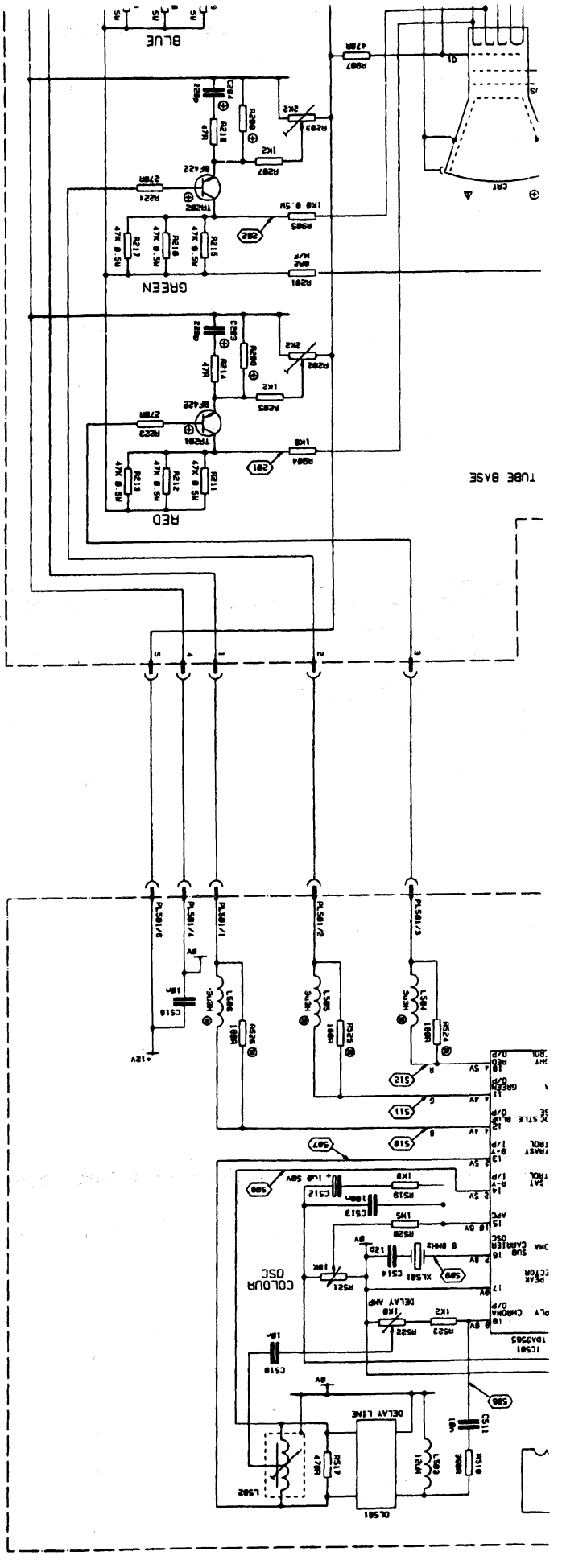
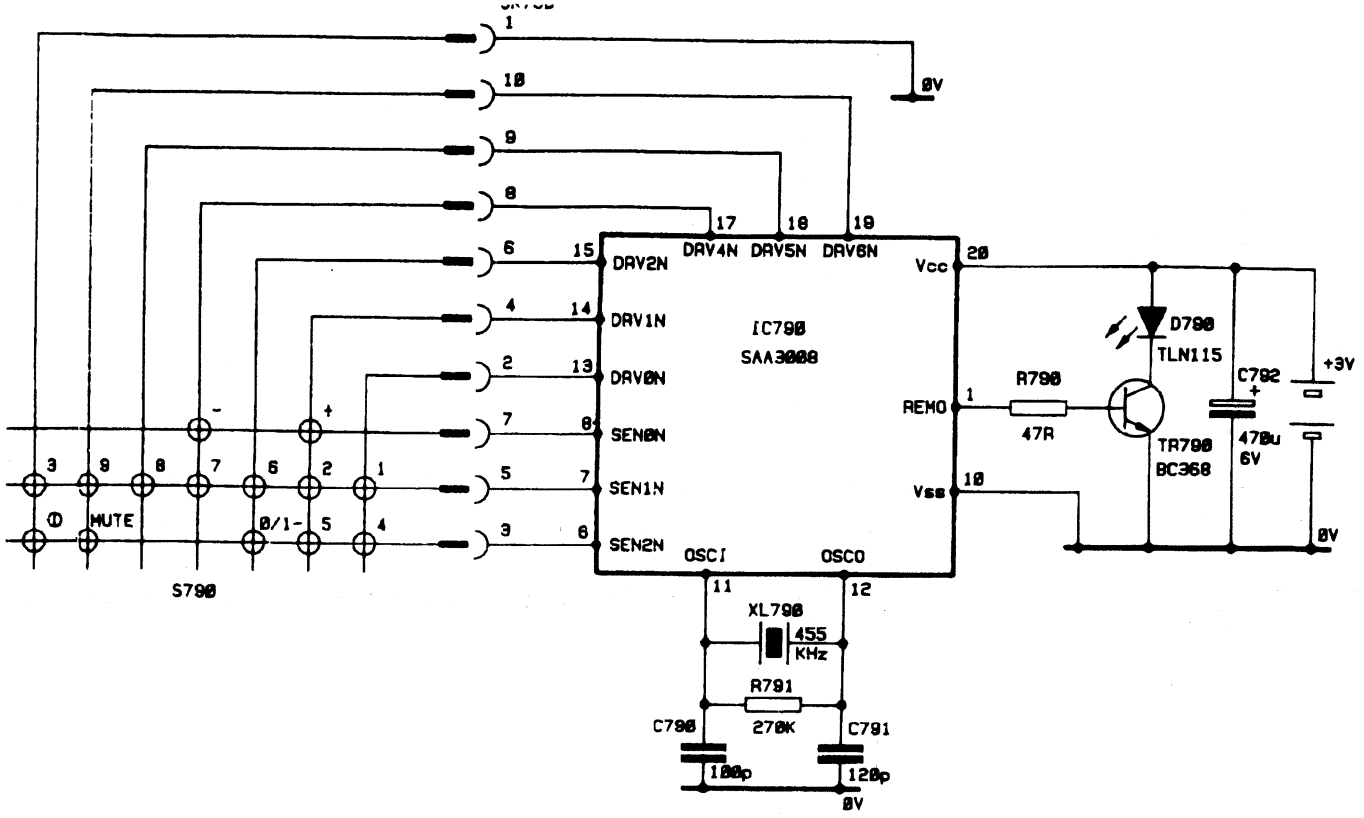
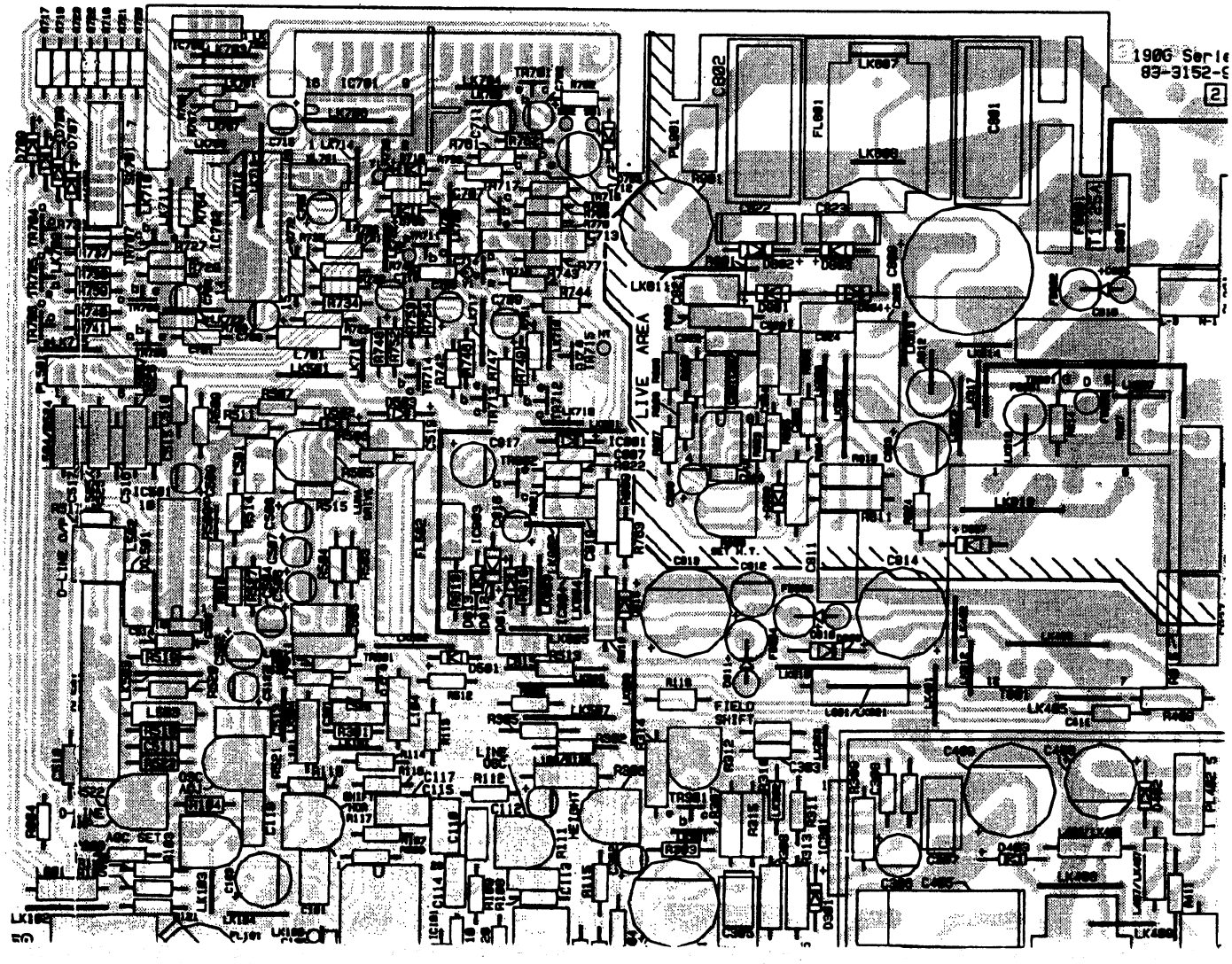
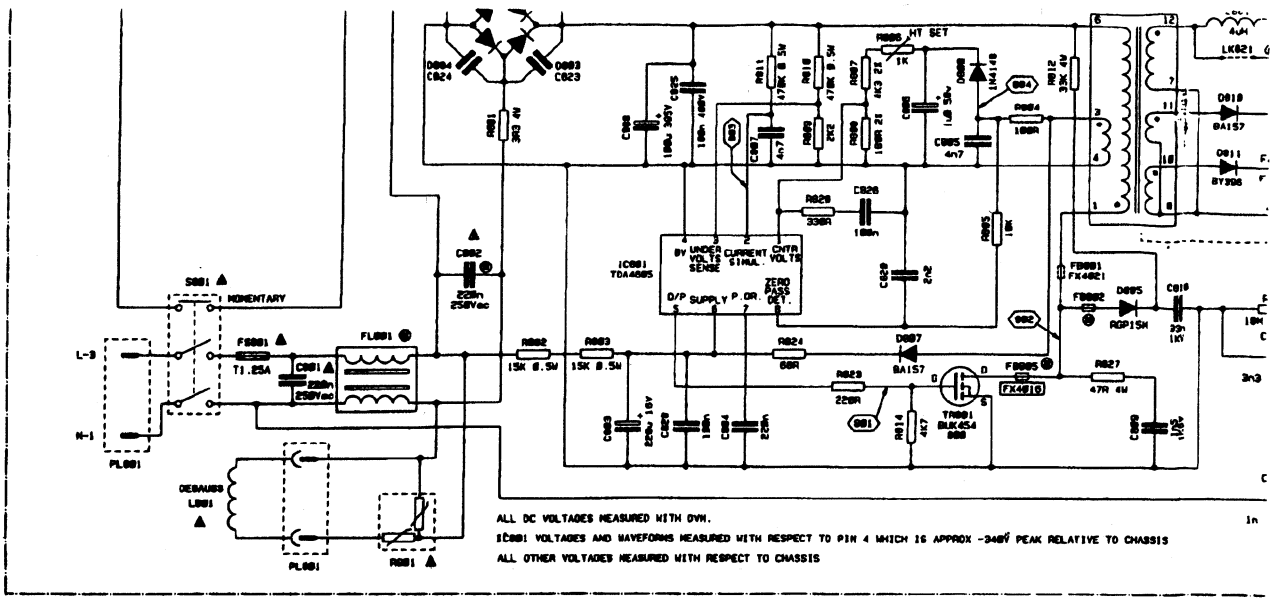
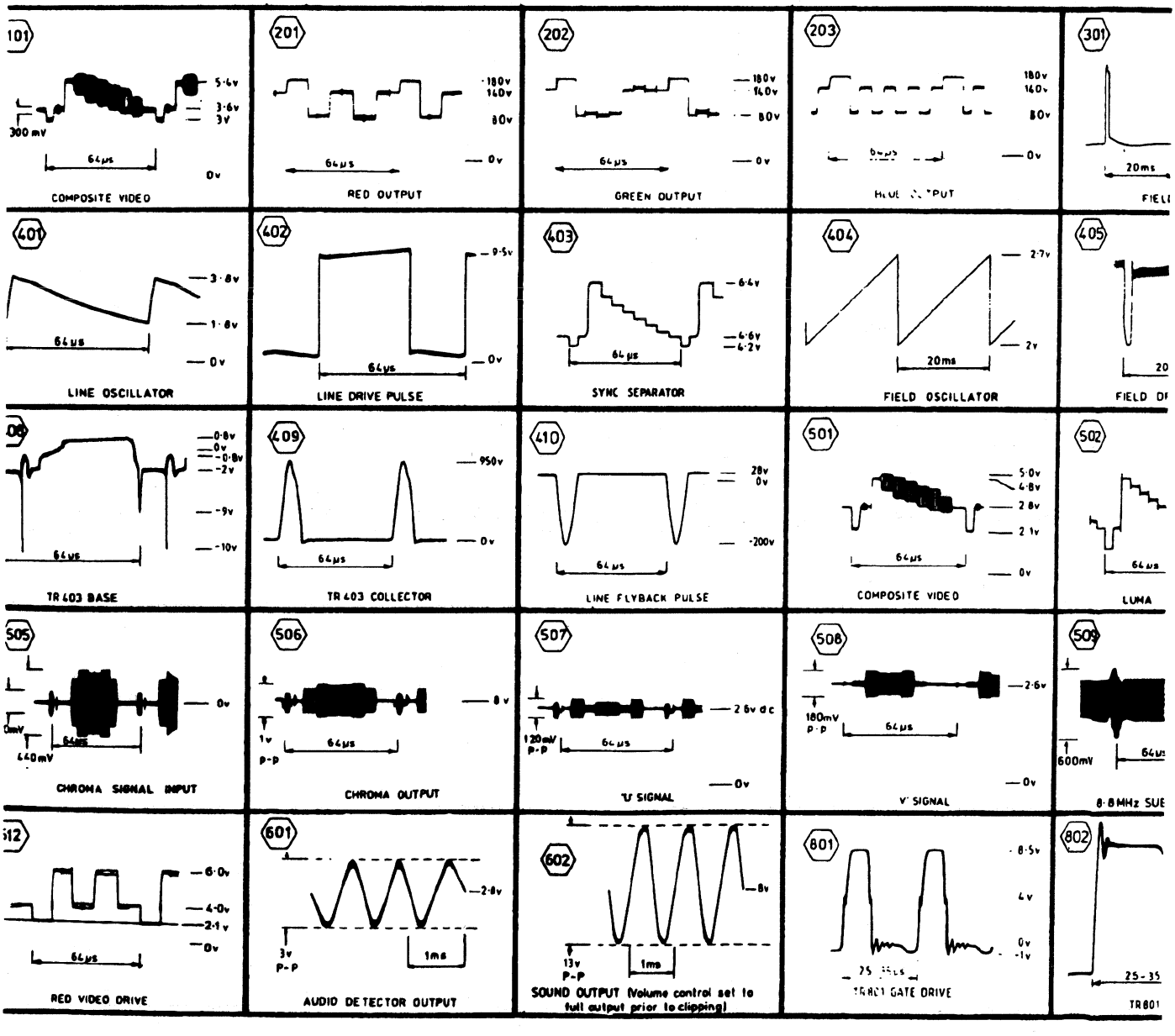

BLUE
GREEN
RED
TUBE BASE
COLOUR OSC
DELAY LINE



RC95 REMOTE CONTROL CIRCUIT DIAGRAM

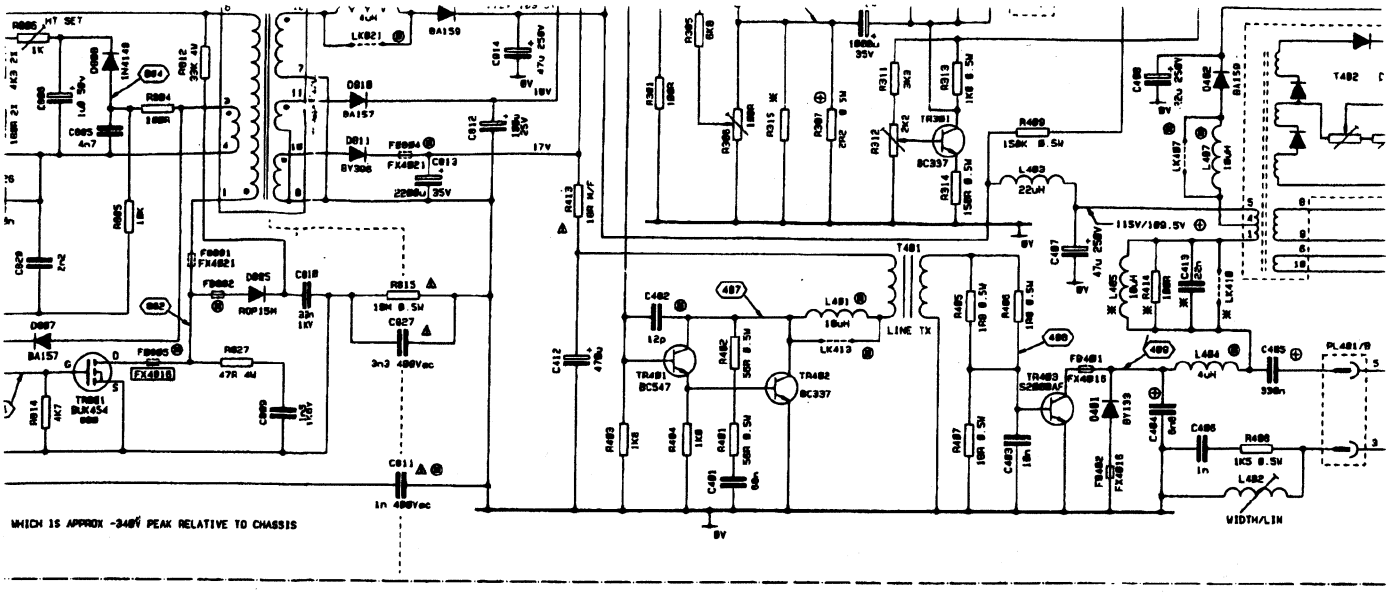


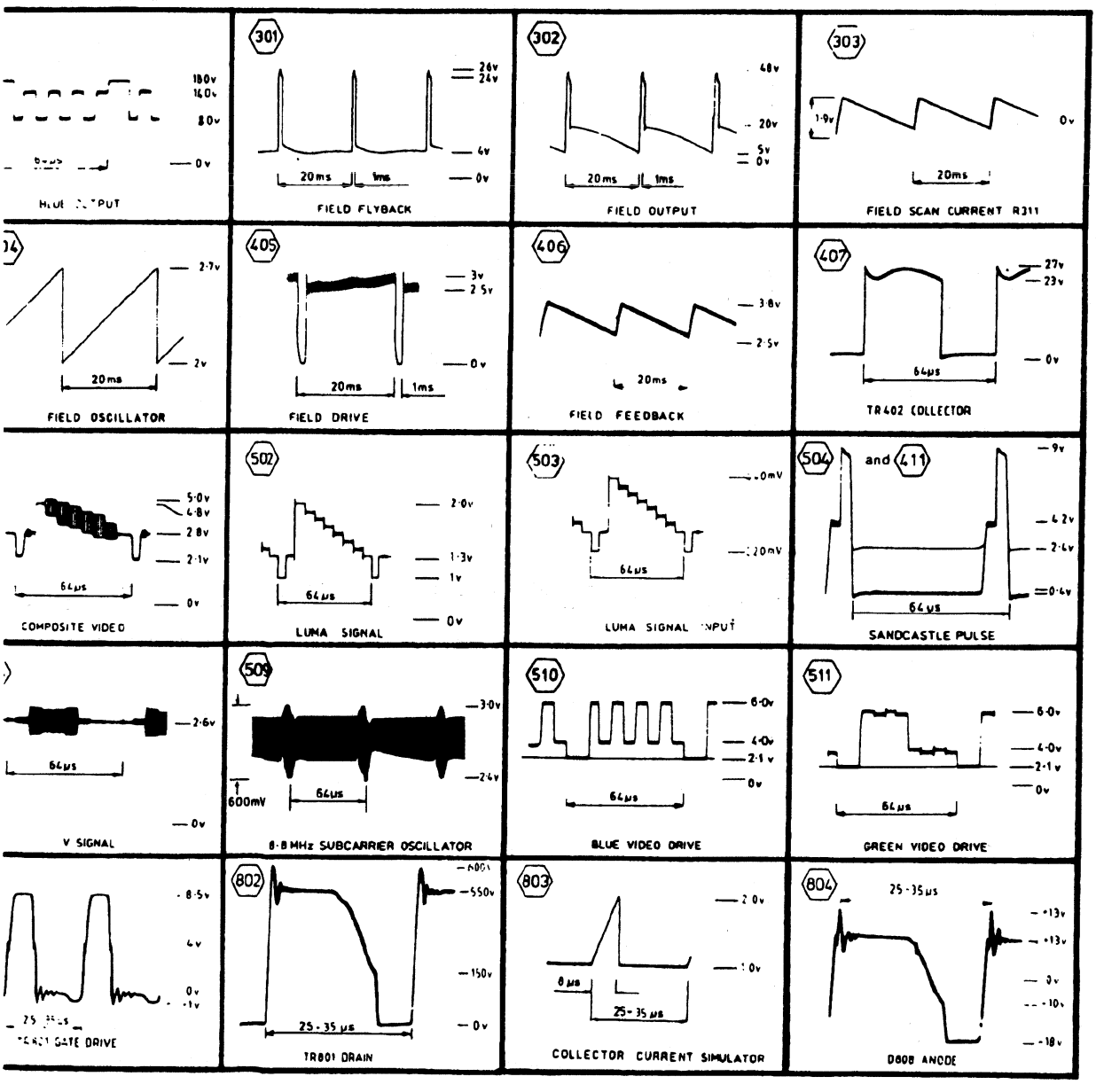

ALL DC VOLTAGES MEASURED WITH DVM.
IC881 VOLTAGES AND WAVEFORMS MEASURED WITH RESPECT TO PIN 4 WHICH IS APPROX -340V PEAK RELATIVE TO CHASSIS
ALL OTHER VOLTAGES MEASURED WITH RESPECT TO CHASSIS



WAVEFORMS

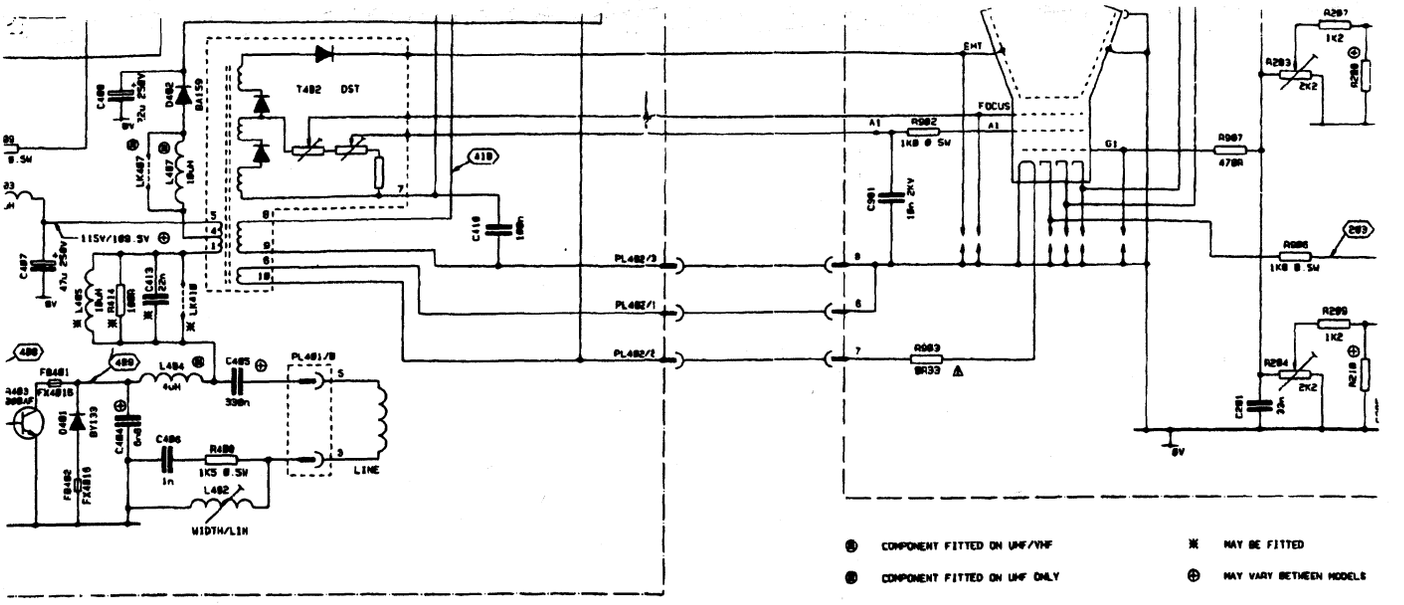
● The waveform diagrams were produced from a receiver displaying colour

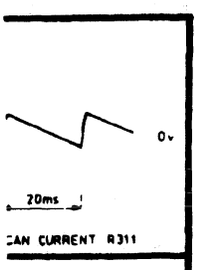


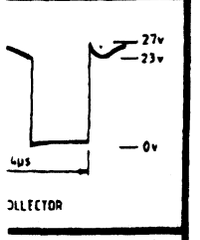


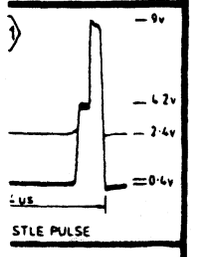
from a receiver displaying colour
passive ÷ 10 probe.

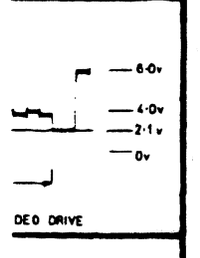
● Waveforms 801 – 804 were taken with oscilloscope set for 'single shot'
operation to achieve clarity

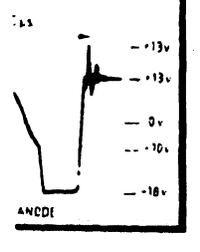






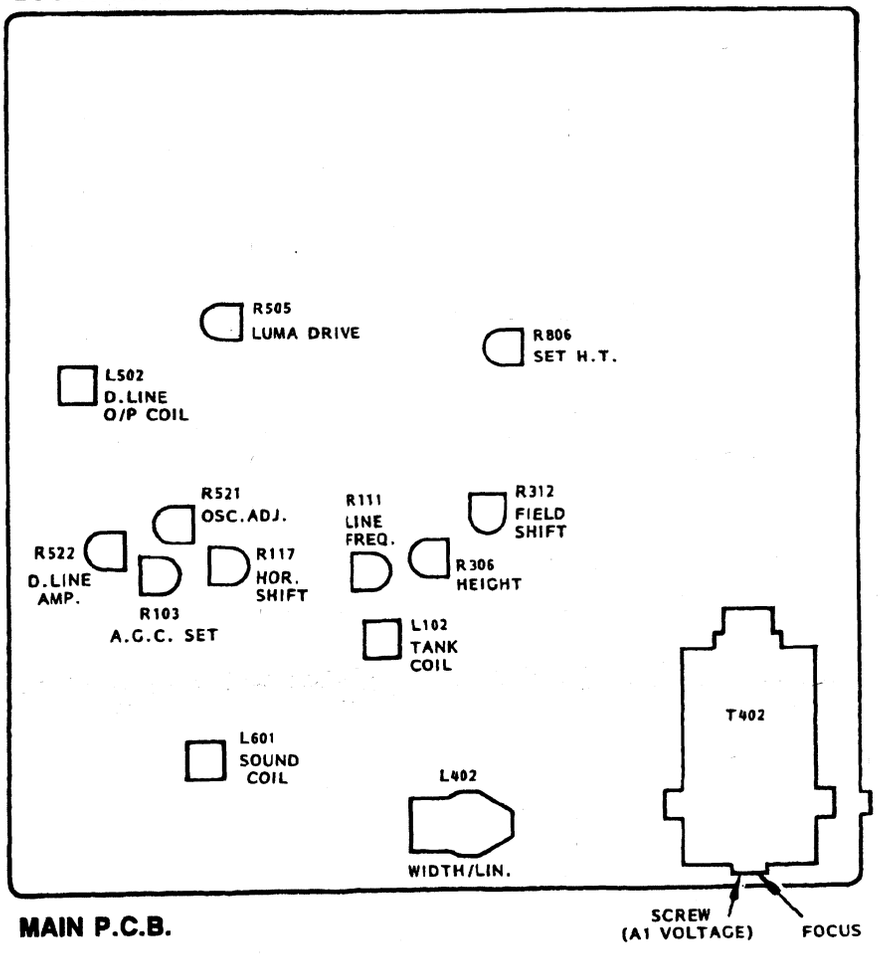




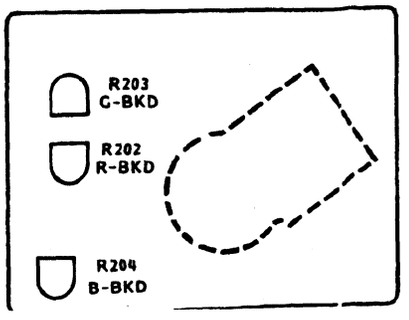


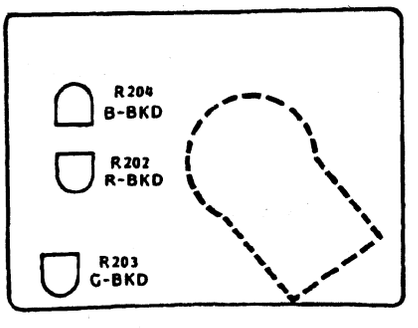
set for 'single shot'

LOCATION OF ADJUSTMENTS



MAIN P.C.B.





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SAFETY

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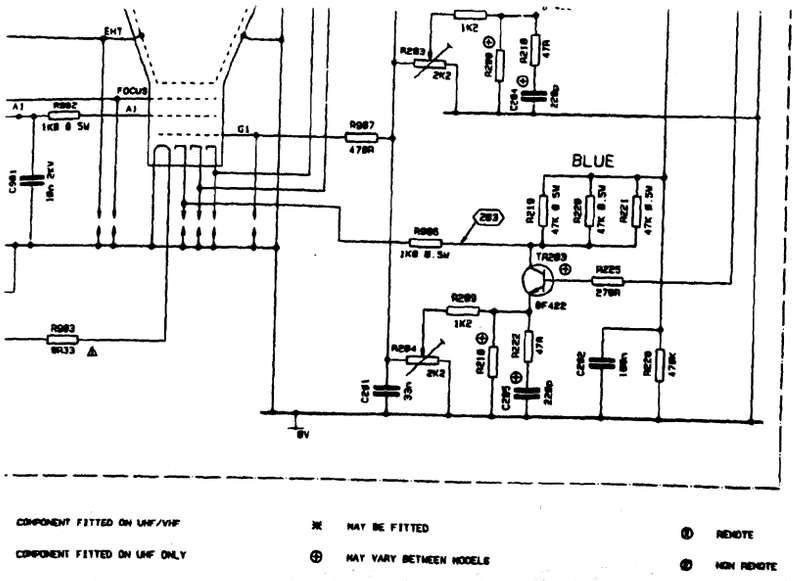
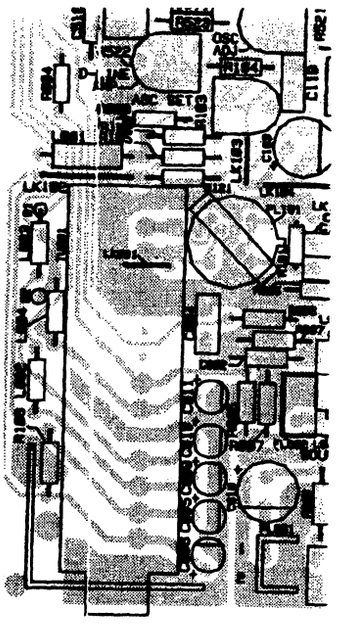
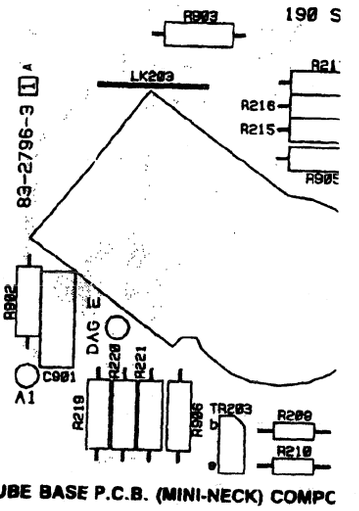


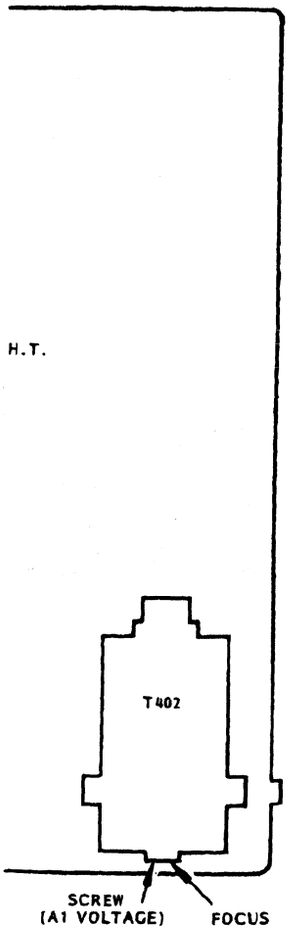


MAIN P.C.B. COMPONENT L

190/195 SERIES COLOUR TELEVISION (SYSTEMS I & B/G)



TUBE BASE P.C.B. (MINI-NECK) COMPC



SAFETY AND ISOLATION

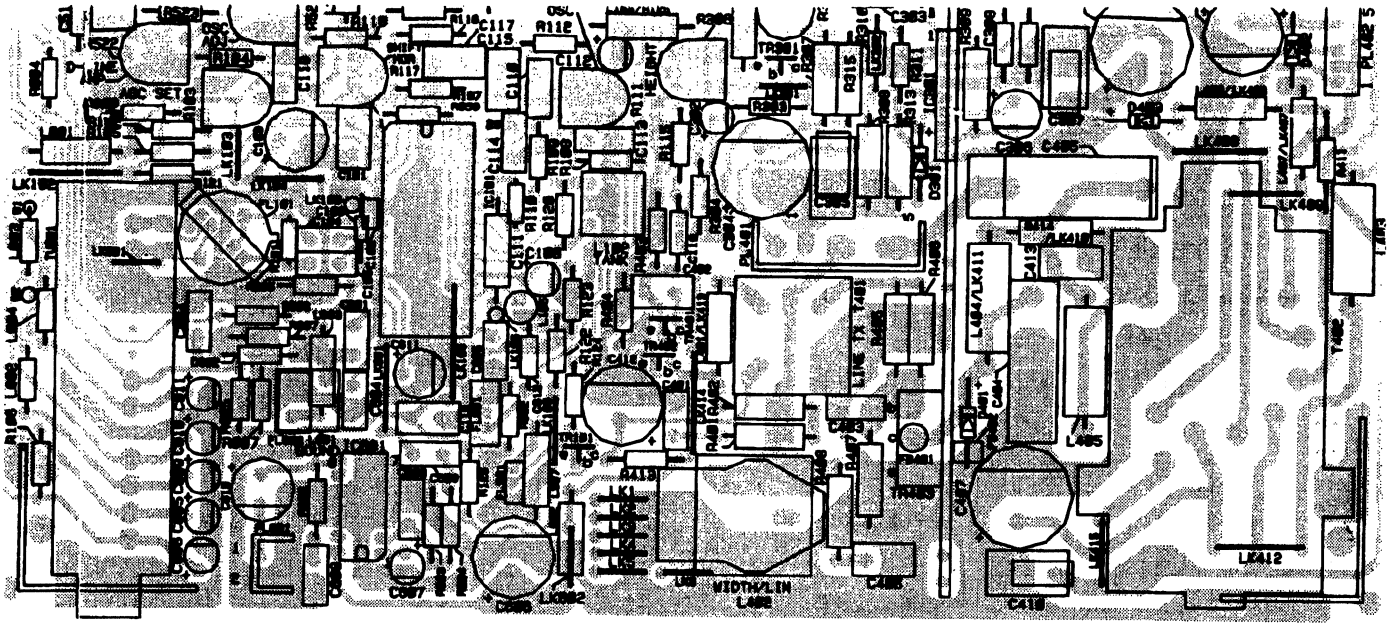
The power supply is always live regardless of the mains supply polarity. For servicing purposes the supply should be connected via a mains isolation transformer.

The power supply section remains charged for about 30 seconds after switch-off. Avoid touching this area during this time.

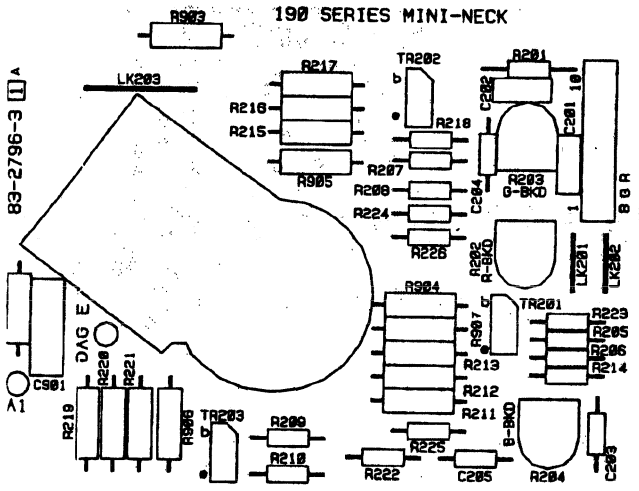
Other than the power supply section, the receiver is isolated from the mains by T801, R815, C811 and C827 (if fitted), and air gaps of 6mm. or more. To maintain built-in safety levels, ensure that after repair the air gaps are not reduced by protruding wires, etc.

Components marked ⚠ in the parts lists and on the circuit diagram are safety approved types and should be replaced only with components supplied or approved by our Service Division. It is recommended that other replacement parts should be of the type originally fitted. This is particularly important for resistors which are stood off the printed circuit board.

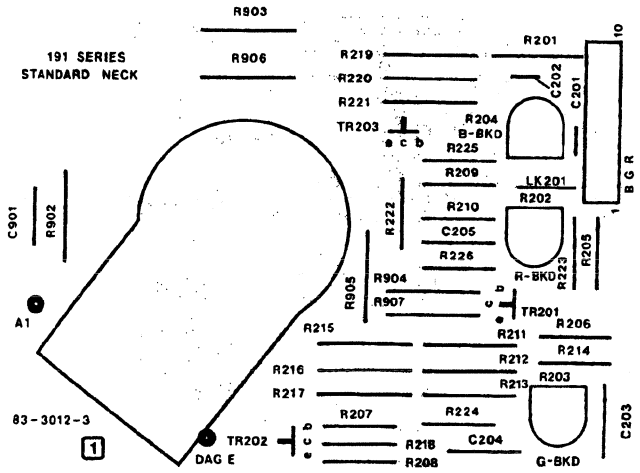
Failure to observe the above guidelines may render the chassis and accessible external parts live, or cause other hazards.



AIN P.C.B. COMPONENT LOCATIONS



3E BASE P.C.B. (MINI-NECK) COMPONENT LOCATION



TUBE BASE P.C.B. (STANDARD NECK) COMPONENT LOCATION

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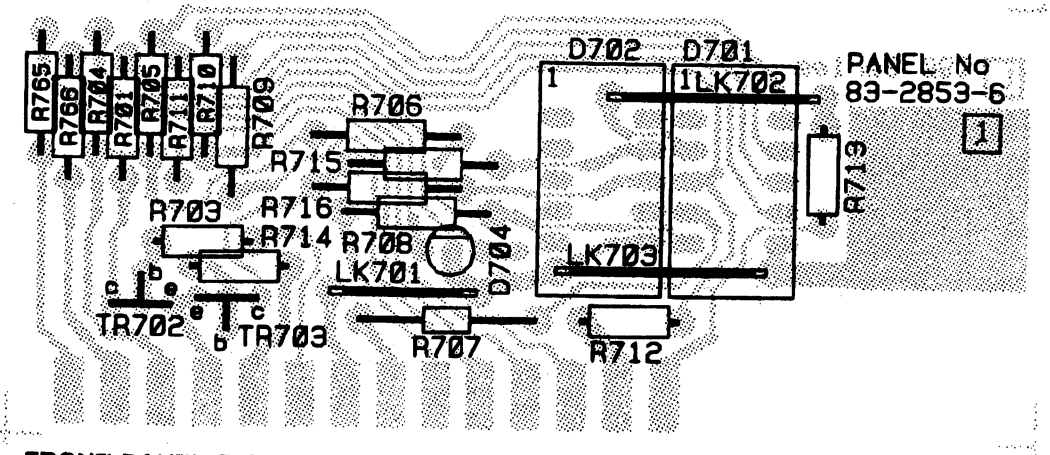

FRONT PANEL P.C.B. – COMPONENT LOCATION